

The Maryland Agricultural College

QUARTERLY.

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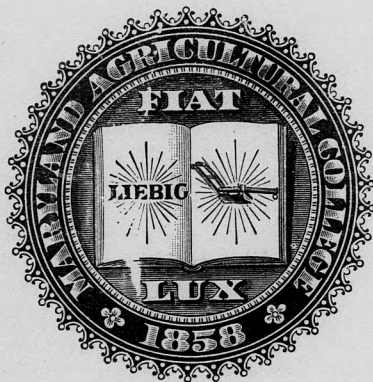
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R. W. SILVESTER, ... President

Edited by H. B. McDONNELL, Professor of Chemistry.



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Issued in the Months of February, May, August and November.

Contributions and Correspondence Invited.

ADDRESS

Chemical Department, Maryland Agricultural College,
COLLEGE PARK, MD.

The Maryland Agricultural College Quarterly is, as its name implies, issued four times a year. It is sent free of charge to all residents of Maryland who request it. The February and August numbers contain the results of the inspection and analysis of commercial fertilizers for the previous season. The November and May numbers will contain the results of analysis of concentrated commercial feeding stuffs and miscellaneous work, generally of the Chemical Department.

We are always glad to receive any suggestion in regard to the work and to have our attention called to brands of fertilizers or feeding stuffs that we may have overlooked in the inspection.

THE VALUE OF SOME CITY WASTES AS FERTILIZERS.

The principal wastes from cities are: night soil, garbage, street-sweepings and ashes.

The question of the fertilizing value of night soil is of great importance to a large number of farmers and gardeners within easy reach of Baltimore by water, especially in the lower part of Baltimore county, where a great deal of this material is used. The absence of a sewage system in Baltimore renders necessary the use of sinks and cess pools. When these are filled the contents are pumped out into tank wagons and barrels made especially for the purpose. It is then hauled to the wharf and emptied into covered barges holding from 100 to 200 tons. The barges are towed to various points where reservoirs have been built, into which they are emptied by means of a powerful steam pump.

The rule is to locate the receiving reservoirs on a bank at such an elevation that they may be emptied by gravity on merely opening a gate or, at most, by only elevating the material to a trough near the top of the reservoir. The reservoirs are simply excavations in the ground, the removed earth being used to elevate the edges, and clay from the bottom lining the sides.

Where two reservoirs join they are separated by a row of posts with boards nailed on both sides, the space between being filled with compact clay. From one to three dozen of these reservoirs are built close together, with an elevated trough so arranged that by simply removing the appropriate slide or gate any one of the reservoirs may be filled without changing the location of the vessel with the steam pump.

Each patron of the system has his own receiver and uses the contents when convenient. The contents of the reservoirs are drawn off into tank wagons and distributed on the land before the crop is planted. The material is locally called "soup," and its application "souping." The ease of application and ready response to this fertilizer cause it to be highly esteemed by those who are using it.

The four samples, the results of analysis of which are given in the accompanying table, were drawn under the direct supervision of

Mr. M. N. Straughn, from the loaded barges, the contents being well stirred with a pole at the place of sampling. The phosphoric acid was determined by Mr. Straughn, the potash by Mr. T. R. Gough and the ammonia by Mr. J. B. Robb.

The nitrogen has been calculated as ammonia. In the samples it was mostly in the form of ammonia carbonate. On adding sulphuric acid there was considerable effervescence, due to the escape of carbonic acid. Suphuric acid was added to the samples in slight excess before drying them in order to prevent loss of ammonia. It is probable there would have been considerable loss of ammonia if this had not been done.

By referring to the analysis of the samples, it will be seen that they are comparatively rich in ammonia, and poor in potash and phosphoric acid, containing about six cents worth of phosphoric acid in a ton and 9 to 13 cents worth of potash. For most crops, especially for grain, it should be supplemented by applications of potash and phosphoric acid.

Two averages of analysis of night-soil by European chemists are given in the table for comparison. Nessler's average is very near to ours, showing, however, a little less ammonia. Wolff's results are remarkable in having four times as much phosphoric acid as ours, with only slightly more potash and a little less ammonia.

If a method could be devised for drying the material economically, the product would be quite valuable, and would compare favorably with high grade tankage or dried fish scrap. Aside from the cost of evaporating the large amount of water, however, any process of this kind would be likely to be objectionable from a sanitary standpoint. This objection, together with that of its bulky nature, will continue to restrict the material to limited areas.

We are unable to get the figures for the amount of this material available in Baltimore, but think it would be about a hundred thousand tons a year. We are informed that it is delivered at the reservoirs for about 50 cents per ton.

We had desired, in this connection, to give analyses of garbage, which is also used somewhat as a fertilizer. In fact, we have some results, but the material is so coarse and so irregular in composition that it is next to impossible to get satisfactory samples. A sample of this garbage should be several tons, to be weighed, dried, weighed again, and ground into a suitable mill. A proper sample of ordinary size could then be drawn from this. Fresh garbage could not be expected to become popular as a fertilizer. The only satisfactory way to utilize it is to pick it over by hand, separate the tin cans, waste paper, etc., from the garbage proper, dry and grind the latter, after extracting the grease. The product is a low grade fertilizer called "garbage tankage."

When fresh garbage is used, it will generally be found profitable to have hogs enough to work it over and consume that which is suitable for food.

STREET SWEEPINGS.

Another waste that is used as a fertilizer, is street sweepings. This material is much less offensive than either of the preceding, and it is readily transported to reasonable distances by rail. This material, however, is not rich in the essential element of fertility.

The composition of street sweepings have been especially studied by Ewell, (Chemical Bulletin, No. 55, U. S. Department of Agriculture), and his results are given in Table II. We have added the ammonia, equivalent to the nitrogen, and also the "Comparative Value," using the same schedule as in Table I. It should be remembered, however, that the elements of fertility in street sweepings are not so quickly available as in the night soil.

"The fertilizing value varies greatly with the nature of the pavements, being practically nothing in the case of material taken from macadamized roads, and approaching that of good stable manure in the case of that collected on the handswept and well paved streets of crowded cities."

ASHES.

Wood ashes have considerable value as a fertilizer, containing from 5 to 8 per cent. of potash, as the soluble carbonate of potash, and considerable carbonate of lime. Both of these are of use in correcting the acidity of "sour" soil.

Coal ashes, however, form the bulk of the ashes from our cities and towns, and it is generally agreed that they have practically no fertilizing value. They contain no nitrogen, and the very small amount of phosphoric acid and potash in them is insoluble.

Ashes may prove beneficial by improving the mechanical condition of "heavy" soils.

TABLE 1.
Analyses and Comparative Values of Night Soil
(Each sample from a different barge.)

Sample Number.	Per Cent. of Water.	Per Cent. of Solids.	Per Cent. of Phos. Acid P_2O_5	Per Cent. of Potash. K_2O	Per Cent. of Ammonia. NH_3	APPROXIMATE VALUE IN A TON OF THE			
						Ammo. at 12c. per lb.	Phos. Acid at 4c. per lb.	Potash at 4c. per lb.	Total Ammo. Phos. Acid & Pot.
X 131	96.06	3.94	0.06	0.16	0.66	\$1.58	\$0.05—	\$0.13—	\$1.76
X 132	96.98	3.02	0.07	0.13	0.52	1.25	0.06—	0.10+	1.41
X 133	98.32	1.68	0.07	0.11	0.46	1.10	0.06	0.09	1.25
X 134	97.94	2.06	0.08	0.12	0.50	1.20	0.06	0.10	1.36
Average	97.32	2.68	0.07	0.13	0.54	1.28	0.06—	0.10+	1.44
*Average of Nessler's			.06	.11	.38	0.91	0.05	0.09	1.05
*Average of Wolff's	95.50	4.50	.28	.20	.43	1.03	0.22	0.16	1.41

Note. "Per Cent." means parts in a hundred; in this case the same as pounds in a hundred pounds of the material. To get pounds per ton multiply the Per Cent. by 20. "Agriculture." These are "Averages of many analyses."

*Results by European Chemists, from Storer's "Agriculture."

TABLE II.

Analysis of Street Sweepings of Washington, D. C., May, 1898.

From Chemical Bulletin, No. 55, U. S. Department of Agriculture. "Comparative Values" added by the Editor, counting Ammonia at 12 cents, Phosphoric Acid at 4 cents and Potash at 4 cents per pound.

Serial No.	DESCRIPTION OF SAMPLES.	Moisture.	Nitrogen.	Ammonia (Nitrogen x $\frac{17}{14}$)	Phosphoric Acid.	Potash.	Comparative Value.
17214	This sample was a composite one, made from several piles which were 6 to 8 mos. old...	45.7	0.39	0.47	0.08	0.09	1.26
17215	Sample taken from pile largely composed of leaves, which had lain on dump 6 to 8 mos.	37.5	0.25	0.30	0.01	0.09	.80
17216	Sample taken from pile which was mostly manure, and which had lain on dump 6 to 8 months.....	28.7	0.32	0.38	0.08	0.11	1.66
17218	Machine collected sweepings. The material had lain on dump but a few days. It contained a very large proportion of sand.....	62.0	0.32	0.38	0.04	0.18	1.09
17219	Same as 17218, except that the material appeared to consist principally of manure...	16.4	0.73	0.88	0.16	0.31	2.49
17220	Fresh sweepings. The material was largely composed of manure.....	39.5	0.55	0.66	0.10	0.37	1.96
17221	Material taken from "Sewer Drops".....	40.5	0.56	0.68	0.08	0.16	1.82
17222	Of the same origin as 17221, but the material had a decidedly different appearance. (Nearly all sand).....	29.5	0.31	0.37	0.10	0.08	1.03
17223	Alley Sweepings, 3 to 4 wks. old. A large percentage of coarse rubbish was separated from the sample before analysis.....	16.4	0.47	0.57	0.02	0.12	1.47
17224	Decayed street sweepings. A composite sample was made up of portions taken from several parts of the dump.....	36.6	0.41	0.49	0.08	0.13	1.33
17225	Same as 17224, except that the sample was taken from one place, which appeared to be especially rich.....	30.0	0.39	0.47	0.06	0.17	1.31
17226	Same as 17220, except that the material had lain for 2 to 4 weeks.....	52.3	0.65	0.79	0.10	0.50	2.38
	Average.....	31.6	0.45	0.54	0.08	0.19	1.51

QUESTIONS AND ANSWERS.

L. S.—(1) What is the difference between nitrogen derived from nitrate of soda and nitrogen from fish scrap or tankage, as to results, if the analysis is the same.

Ans.—Nitrate of soda contains nitrogen equivalent to 19 per cent. of ammonia, in a very soluble and quickly-available form; it acts as plant food without undergoing previous fermentation or change. It is so soluble, however, that it is easily lost from the soil in the drainage water. Hence it is used where a quick, but not prolonged, action is desired. Dried fish and tankage contain nitrogen equivalent to about 8 per cent. ammonia. The nitrogen is in organic matter which must undergo fermentation and be changed to nitrate before it becomes soluble and the plants can take it up. Consequently its action is slower and more prolonged than the nitrate. Dried fish and tankage also contain about 8 per cent of phosphoric acid.

(2) What is the difference between muriate of potash and potash derived from kainit, the analysis being the same in a ton of fertilizer?

Ans.—Muriate of potash contains the equivalent of 50 to 54 per cent. of actual potash, or 85 to 90 per cent. of muriate of potash; that is, it contains only 10 to 15 per cent. of material that has no value. Kainit only contains one-fourth as much actual potash—12 to 13 per cent.—equal to twice as much sulphate of potash, the balance of the kainit being common salt, sulphate of magnesia, etc., substances having little or no value as fertilizer. In a mixed fertilizer, with the analysis the same, the value would be practically the same no difference from which source the potash were derived. The kainit being so much more bulky, however, it is not possible to make as high a grade of fertilizer with it, because the large amount of it required displaces some of the other ingredients.

(3) Would it do to use kainit sufficient to analyze 6 per cent. of potash?

Ans.—Yes, it can be done, but it is necessary to make the mixture half kainit. We do not recommend it.

(4) Is tankage and fish used as a filler. If there is any virtue in them as a fertilizer, what is it?

Ans.—They are not used as fillers, but are valuable sources of nitrogen and contain some phosphoric acid as well; see answer to No. 1.

(5) What do you think of the following formula:

400 lbs. Dissolved bone,	150 lbs. Nitrate of soda,
400 " " " black,	400 " Tankage
250 " Muriate of potash,	400 " Dissolved rock.

Ans.—This formula makes a very good fertilizer, but is more of a "shot-gun prescription" than is necessary. You can make as good a fertilizer with fewer ingredients; it would be easier to mix, practically as good, and cheaper. It could be simplified as follows:

1200 lbs. Dissolved rock,	200 lbs. Nitrate of soda,
250 " Muriate of potash,	350 " Ground fish or tankage.

This would analyze as follows: Available phosphoric acid, 9 per cent., potash 6 per cent., and ammonia, 3.25 per cent.

FOR PRACTICAL FARMERS.

SHORT WINTER COURSES
IN
AGRICULTURE and DAIRYING
AT THE
Maryland Agricultural College
and Experiment Station.

AGRICULTURAL COURSE.—January 6th, to March 17th, 1902. A ten weeks' course, including lectures and practical work in feeding, fertilizers, farm dairying, stock judging, crop production, soils, cultivation, carpentry, blacksmithing, veterinary science, horticulture, spraying for insect pests and plant diseases, and farm accounts.

FARM DAIRY COURSE.—January 6th, to March 3rd, 1902. An eight weeks' course, consisting of lectures and practical instruction in creamery work, stable management, feeding, breeding and dairy bacteriology.

No Charge for Instruction or Lodging

in either of these courses. Table board will be furnished by the college at four dollars a week. A large dormitory building designed especially for Short Course students has just been completed.

All students are expected to bring bed clothes, pillows, towels and table linen.

For further particulars, address:

R. W. SILVESTER, President,
Maryland Agricultural College, College Park, Md.

• or

H. J. PATTERSON, Director,
Maryland Agricultural Experiment Station, College Park, Md.